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NOTES ON THE ASTERACEAE OF SUMATERA

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ABSTRACT

An account of the tribe composition, endemic taxa, comparison with adjacent areas and weedy Asteraceae of Sumatera is given. Based on the records of January 2000, there are 133 species of 74 genera in 11 tribes.

The tribe Heliantheae is the largest, with 28% of the total number of the genera, followed by Astereae with 15%, Inuleae 12%, Senecioneae 10%, Anthemideae, Eupatorieae and Lactuceae 8%, the other tribes are represented by 4% or less.

The most diverse genus is *Blumea* with 14 species. Other genera are only represented by 10 species or less, usually 4, or 3, or 2, and mostly by 1 species only.

Thirty nine or about 53% are exotic genera and the native ones are less than half of the total number of the genera.

In terms of indigenous and endemic species, Sumatera is richer than Java. There are 1 genus, 7 species and 2 varieties of Asteraceae endemic to Sumatera.

A number of 43 important weed species were introduced from Tropical America, Africa, Asia and Europe. Among these *Chromolaena odorata* and *Mikania micrantha* are reported as the most noxious ones.

List of the genera and species recorded in Sumatera is provided in this paper.

Key words : Asteraceae/Sumatera/compositions/endemic species/distribution/weedy Asteraceae

INTRODUCTION

Asteraceae is one of the largest families of flowering plants which has not been revised for the Flora Malesiana (Ross 1993).

This paper is a report on the results of the study on the Asteraceae of Sumatera based on the records up to 2002.

Fundamental work of this family was done by Cassini (1817,1818, 1826-1834), and Bentham (1873) and Bentham & Hooker (1873). Bentham's tribal classification has stood the test of time, and some modifications were introduced by Hoffmann (1890-1894), Dalla Tore and Harms (1907) and Melchior (1964). Although the 13 tribes recognized by Bentham & Hoffman have been largely accepted up to the present, they are obviously in need of modification considering recent discoveries in biochemistry, palynology analysis, micromorphology, anatomy, cytology, micromolecular chemistry, and semantide analysis especially cpDNA. Cladistic method has been widely applied, subsequent more precise generic, and tribal concepts have been developed. It has become clear that not only quite a number of genera have been misplaced, but others require a transfer to other tribes (Jeffrey 1995).

Miquel (1856) made the first revision of the Asteraceae of the Malay Archipelago followed by van Hasselt & Boerlage (1884), and Boerlage (1891) gave an enumeration of the species. The latest partial revision of the Asteraceae of the Malay Archipelago was made by Koster, who elaborated the tribes Eupatorieae and Vernonieae (Koster 1935, 1941, 1948, 1952, 1953, 1958). She treated 5 species of *Adenostemma,* 2 of *Ageratum,* 1 of *Centratherum,* 2 of *Elephantopus,* 8 of *Eupa-torium , 2* of *Ethulia,* 1 of *Mikania.* In total, 57 species were described of which 11 species are introduced. She also revised the Compositae of Java (Koster 1965) and New Guinea (Koster 1966; 1970; 1976; 1979; 1980). van Royen (1983) treated Compositae component of the alpine flora of New Guinea for the species above 3000 m. After these publications, there has been no other comprehensive one on the Asteraceae of Malesia.

The first initial survey of the flora of Sumatera began with the publication of Jack in 1820. It was followed by several authors e.g. Miquel (1856-1861) who published them separately in a number of publications. But after Miquel there has been no attempt yet to bring together the vascular flora of Sumatera. The only exception is the revision of the Euphorbiaceae of Sumatera by Shaw in 1981. Whitmore and Tantra (1986) listed only those species with either a bole of at least 35 cm diameter, and/ or 20 m in height, they cited only eight out often species of *Vernonia* reported for Sumatera by Koster (1935). *Vernonia cinerea, V. cymosa, V. forbesii, V. patula* and *V. vagans* which were cited by Whitmore and Tantra as a tree are actually herbs, climbers or shrubs. *Vernonia* is the only genus where four out of the ten species are trees up to 30 m in height: *V. arborea, V. durifolia, V. patentissim and V. subdentata,* while the other six species of *Vernonia* are herbs or shrubs. Other Asteraceae genera consist of only herbs and shrubs.

Miquel (1861) treated 25 species of 20 genera in 7 tribes of Asteraceae in Sumatera. He described 5 species of *Blumea, 2* species of *Artemisia,* and 1 species of several genera i.e. *Adenostemma, Asteromoea, Conyza, Eclipta, Elephantopus, Emilia, Erigeron., Gnaphalium, Gynura, Lagenophora, Microglossa, Myriactis, Sonchus, Sphaeranthus, Wedelia, Vernonia, Xanthium* and *Youngia.*

Boerlage (1891) in his enumeration of the Asteraceae of Sumatera listed 41 species of 28 genera in 8 tribes. He listed 5 species *of Blumea,* 3 species of *Senecio* and *Vernonia,* 2 species of *Adenostemma, Anaphalis, Conyza, Wedelia,* and 1 species of several genera i.e. *Asteromoea, Bidens, Cosmos, Dichrocephala, Eclipta, Emilia, Enydra, Erigeron, Microglossa, Myriactis, Sphaeranthus, Spilanthes* and *Xanthium.*

Koster (1935) in her treatment of the tribes Eupatorieae and Vernonieae in Sumatera described 9 species of *Vernonia,* 3 species *of Adenostemma, 2* species of *Ageratum* and 1 species *of Elephantopus, Mikania* and *Eupatorium* .

Nasution (1984) described 5 species of weedy Asteraceae at the plantations of Aceh and North Sumatera, while Soerjani *et al* (1987) described 25 species of Asteraceae in the ricefields of Sumatera. In total, there were 69 species of Asteraceae in Sumatera known by several authors: Miquel 1861; Boerlage 1891; Koster 1935 and Soerjani *et al.* 1987. The records up to December 1998 showed that

67 genera and 122 species in 10 tribes of Asteraceae in Sumatera were recognized (Tjitrosoedirdjo 2001). Up to January 2000, the author has described 133 species of 74 genera in 11 tribes in Sumatera (Table 1 and Appendix 1).

Four new taxa were recognized by Tjitrosoedirdjo (2002) namely *Prenanthes steenisii, Prenanthes sumatrana, Senecio dewildeorum* and one variety *Emilia sonchifolia* var. *lanceolata.*

In Sumatera, Asteraceae has been recorded in a wide variety of habitats including, montane, highlands, lowlands, *fmperata-fields,* open spaces of the plantations, and agricultural fields. Representatives may be found in nearly every type of habitat, but few taxa are present in tropical rain forests, swampy, mangrove and aquatic areas. The species are predominantly perennial herbs and shrubs.

MATERIALS AND METHODS

Herbarium specimens of the Asteraceae of Sumatera and the surrounding islands were studied from several herbaria. The Herbarium Bogoriense (BO) and BIOTROP Herbarium (BIOT) served as the major sources. Most of the specimens at BO were collected during the colonial times, while those at BIOT was gathered after 1970's and some specimens were collected by the author. Selected specimens were kindly obtained on loan from Herbarium of Andalas University ('ANDA') representing taxa from West Sumatera and also some from FRIM (Forest Research Institute Malaysia's/KEP) were also studied. Some specimens of *Blumea, Lactuca,* and *Senecio* were provided on loan from the National Herbarium of Netherlands (the former Rijksherbarium:L). Additional specimens were collected during the course of this study from Aceh, North Sumatera, Riau, Jambi, West Sumatera, South Sumatera and Lampung.

Data and information on the morphology, habitat, and distribution were collected from the specimens, literature and field observations.

RESULTS AND DISCUSSIONS

The Tribe Composition

Based on the studies up to January 2000, there are 133 species of 74 genera in 11 tribes of Asteraceae in Sumatera that have been recorded (Table 1 & Appendix 1). There is an increase compared to the records as listed in 1998, where 122 species of 67 genera are in 10 tribes (Tjitrosoedirdjo 2001).

The 11 tribes are Anthemideae, Astereae, Cardueae, Eupatorieae, Heliantheae, Inuleae, Lactuceae, Mutisieae, Senecioneae Tageteae, and Vernonieae. The tribe Cardueae is a new record.

Thirty-nine genera or about 53% are exotic (Table 1), and the native genera are less than half of the total number of the genera. More than 61% of these genera

contain only one species, 9% have three species and 5% have 4 species. Others such as *Vernonia* and *Blumea* have ten and fourteen species, respectively.

Three tribes are found in Java but not in Sumatera: *Arctoctideae, Calenduleae,* and *Helenieae.*

Notes on Distribution of Selected Genera of Asteraceae in Sumatera

Anaphalis is a genus with a disjunct range distribution: it has been recorded from Europe, Asia and North America. In Sumatera it is represented by two native montane species.

Blumea has an African-Asiatic-Australian range. Most of the species are found in Malesia with 14 in Sumatera which makes it the largest genus in Sumatera. The other genera have 1 to 4, rarely up to 10 species.

Blumeopsis is a monotypic endemic genus of Eastern Asia. In Malesia, it is only found in Sumatera (Aceh and North Sumatera).

Carpesium is a genus of the northern temperate or subtropical Europe through Asia to Japan. One possibly introduced species has been found in the mountains of Aceh.

Lactuca is a cosmopolitan genus, with three species in Sumatera.

Launaea is a new generic record for Sumatera. *Launea sarmentosa* was found during the course of this study at a sandy beach near Uelele, Aceh. Kilian (1997) reported that the species has a scattered distribution from East Africa to South China (Guangdong). It is found in the Andaman Nicobars and in Thailand. It is also found in Northeast Australia. In Malesia, it is very rare and until now only known

Table 1. The number of tribes, genera, species, and endemic species/ variety of Asteraceae in Sumatera based on the records up to 2000

No.	Tribes	Name of the genera	No. of genera	No. of species	No. of endemic species*/ variety**
1.	Anthemideae	*Achillea*, Artemisia*, Centipeda, Chrysanthemum*, Cotula, Leucanthemum**	6	8	-
2.	Astereae	*Aster*, Asteromoea*, Boltonia*, Conyza, Dihcrocephala, Grangea, Lagenophora, Microglossa, Myriactis, Rhynchospermum, Solidago**	11	24	-
3.	Cardueae	*Centaurea**	1	1	-
4.	Eupatorieae	*Adenostemma, Ageratum*, Austroepatorium*, Chromolaena*, Eupatorium*, Mikania*	6	10	0/1

Table 1. Continued

No.	Tribes	Name of the genera	No. of genera	No. of species	No. of endemic species*/ variety**
5.	Heliantheae	*Acmella, Bidens, Clibadium*, Coreopsis*, Cosmos*, Dahlia*, Eclipta, Eleutheranthera*, Enydra, Gaillardia*, Glossocardia*, Galinsoga*, Helianthus*, Sigesbeckia*, Sphagneticola, Synedrella*, Tithonia*, Tridax*, Wedelia, Xanthium*, Zinnia**	21	32	-
6.	Inuleae	*Anaphalis, Blumea, Blumeopsis, Carpesium, Gnaphalium, Helichrysum*, Laggera, Pluchea, Sphaeranthus*	9	25	-
7.	Lactuceae	*Lactuca, Launaea*, Prenanthes, Sonchus*, Taraxacum*, Youngia*	6	14	3/0
8.	Mutisieae	*Ainsliaea, Gerbera**	2	2	-
9.	Senecioneae	*Cisammpelopsis, Crassocephalum*, Emilia, Erechtites*, Gynura, Notonia*, Senecio*	7	12	2/1
10.	Tageteae	*Porophyllum*, Tagetes**	2	2	-
11.	Vernonieae	*Elephantopus, Struchium, Vernonia*	3	13	2/0
		Total	**74**	**133**	**7/2**

Note : * exotic genus

autochthonously in Malesia with the Sumateran collection closing the gap. Its occurrence in Southwest Java and Northwest Australia concurs with the ancient sites of European sailing ships that carried sand as ballast which had been obtained at beaches in East Africa or Sri Lanka. These initially landed in Pelabuhan Ratu (Wijnkoopsbaai) where ballast was removed, or floundered on the shores of Northwest Australia thus introducing the *Launaea.*

Senecio is the largest genus of Asteraceae, and a very heterogeneous one. Its species are found in all parts of the world. In Sumatera, there are two endemic montane species.

Sonchus is another cosmopolitan and weedy genus. There are three species in Sumatera. *Sonchus oleraceous* is commonly found at the mountain regions in Java. In Sumatera, it is only found in Takengon, Aceh.

Taraxacum is a cosmopolitan genus of weedy species and an extremely complex genus. There are few regularly amphimictic species, some that are occasionally amphimictic, but a vast number appear to be exclusively apomictic, often with

defective or quite abortive pollen. The apomictic forms are polyploids which have presumably arisen from primary interspesific hybridization. The only species found in Sumatera is tentatively named *Taraxacum javanicum* here, but may very well represent an undescribed (micro) species.

Vernonia is a wide ranging genus with species in tropical America, Africa, Madagascar. Jones (1979; 1981), followed by Jeffrey (1988), has suggested that actually two main subgenera, if not genera or even subtribes may be involved, an Old World one, *Vernonia* subgen. *Orbivestus*, and satellite taxa, and one from the New World, *Vernonia* s.s. and satellites. If correct, this means that Malesian species attributed to sect. *Lepidaploa* actually belongs to a possibjy undescribed section. In Sumatera, there are ten species of which two are endemic.

Endemic Taxa and Their Distribution in Sumatera

The Asteraceae is generally a temperate to subtropical family, yet it forms an important part of the Malesian flora. Being temperate, it is therefore not surprising that the mountain areas in Sumatera are richer in taxa than the lowlands.

Of the 133 species recorded in Sumatera, nearly 50% have been introduced, while there are only 7 endemic species and 2 endemic varieties (Table 1). These montane endemics are temperate genera and it supports the opinion of van Steenis (1933) that in the tropics such as Malesia, they are restricted to the mountains and represent only small offshoots from their generic centers. When compared for instance with India which has 242 endemic taxa (out of c. 900) the number in Sumatera is very low. In India too many endemics (116) are confined to the montane regions of the Himalayas (Rao & Dart 1996).

Aceh and West Sumatera showed the highest degree of endemism, apparently due to the considerable areas of high mountains. There are one variety and five species endemic to Aceh i.e. *Adenostemma lavenia* var. *sessilifolium, Senecio dewildeorum, S. sumatranus, Prenanthes steenisii, P. stenolimba,* and *P. sumatrana* which are concentrated at the Mount Leuser Nature Reserve and its surrounding areas (Fig. 1).

Three endemic species of *Prenanthes: P. steenisii, P. stenolimba,* and *P. sumatrana,* have been found in Aceh above 2000 m altitude (Tjitrosoedirdjo 2002).

In West Sumatera four endemic taxa have been found on the mountains of Kerinci, Merapi, Sago, Talamau and Talang namely *Emilia sonchifolia* var. *Lanceolata, Senecio sumatranus, Vernonia durifolia* and *Vernonia forbesii. Emilia, sonchifolia* var. *lanceolata* a newly described variety is endemic to Mount Kerinci (Tjitrosoedirdjo 2002).

Jambi, South Sumatera, and Lampung have only one endemic species each, while there are no records of endemics in Bengkulu and Riau.

The two endemic species of *Senecio, S. sumatranus* and *S. dewildeorum* have been found at altitudes above 2500 m. *Senecio dewildeorum* collected by van Steenis from Mount Goh Lembuh, Aceh, and by de Wilde and De Wilde-Duyfjes from Mount Leuser appears to be endemic to the mountain area of Aceh (Tjitrosoedirdjo 2002).

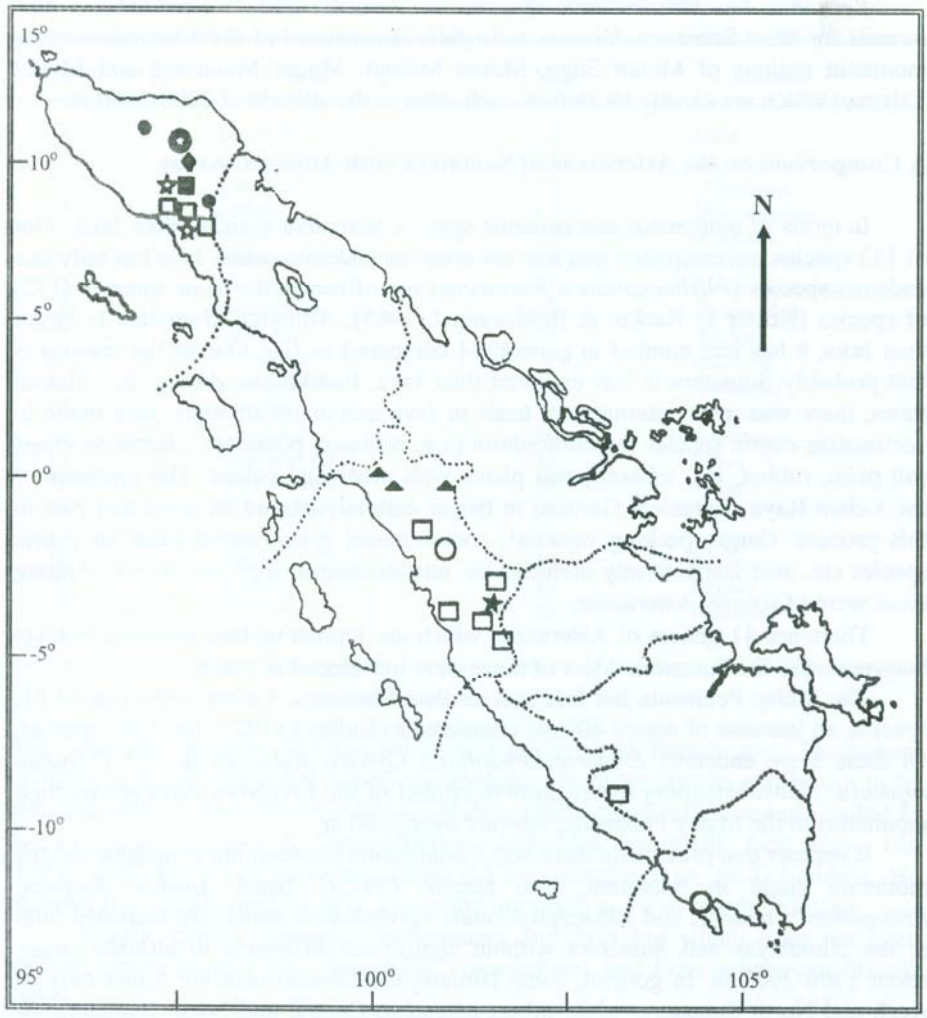

Figure 1. Distribution on the endemic taxa of *Asteraceae* in Sumatera; ♦ = *Adenostemma lavinia* var. *subsessilifolium*; ★ = *Emilia sonchifolia* var. *lanceolata*; ● = *Prenanthes steenisii*; ✪ = *Prenanthes stenolimba*; ☆ = *Prenanthes sumatrana*; ■ = *Senecio dewildeorum*; ▭ = *Senecio sumatranus*; ▲ = *Vernonia durifolia*; O = *Vernonia forbesii*.

Vernonia, has two endemic species: *V. durifolia* and *V. Forbesii* are new records for West Sumatera. *Vernonia durifolia* is restricted to West Sumatera at the mountain regions of Mount Sago, Mount Merapi, Mount Malintang and Mount Talamau which are closely located to each other at the altitude of 2000-2600 m.

A Comparison on the Asteraceae of Sumatera with Adjacent Areas

In terms of indigenous and endemic species, Sumatera is richer than Java. Out of 133 species, seven species and two varieties are endemic, while Java has only one endemic species *(Phyllocephalum frutescens)* out of nearly the same number (132) of species (Koster in Backer & Bakhuizen f. 1965). Although, Sumatera is larger than Java, it has less number in genera: 74 compared to 107. One of the reasons is that probably Sumatera is less explored than Java. In addition, during the colonial times, there was more international trade in Java and many attempts were made to acclimatize exotic species for horticulture (e.g. cabbage, potatoes), plantation crops (oil palm, rubber, tea, tobacco) and plants with medicinal values. The presence of the Kebun Raya (Botanical Garden) in Bogor certainly played an important part in this process. Cargo, packing material, contaminated grain, introduction of exotic species etc. also inadvertently included the introduction of incipient weeds. Among these were of course Asteraceae.

There are 41 genera of Asteraceae which are known in Java but have not yet been recorded for Sumatera. Most of these were introduced in Table 2.

The Malay Peninsula has less species than Sumatera. Turner (1995) listed 61, species, an increase of nearly 40% as compared to Ridley's (1923) list of 44 species. Of these 3 are endemic: *Erigeron oreophilus, Gynura malaccensis,* and *Vernonia rupicola.* Notwithstanding the suggestive epithet of the *Erigeron,* there are no high mountains in the Malay Peninsula. Few are over 2100 m.

It appears that previously there was a connection between the Himalaya and the mountain chain in Sumatera. Van Steenis (1933b) listed *Ainsliae latifolia, Prenanthes scandens,* and *Rhynchospermum verticillatum* which are recorded both in the Himalayas and Sumatera without significant difference in altitude range, about 1300-2900 m. In general, some Himalayan/Malesian taxa are found only in Aceh and North Sumatera, while others extend to Central and South Sumatera, or even further to Java, South Sulawesi and Nusa Tenggara.

The Leuser complex is especially rich in the Himalayan elements, while there is also a floristic connection over the Kinabalu to Luzon, and over Sulawesi and Seram with New Guinea. It is curious to note that these high-montane species (non-Asteraceae) were able to reach the Leuser complex, but did not venture further down south. The fact that the complex is non-volcanic while the Bukit Barisan and the mountains in Java are igneous, may offer a clue to this •unsolved question. Other species are apparently not hampered by the occasional devastation that occurs on volcanic summits and were able to travel south.

There are three genera, known in Asia and Sumatera which have not been recorded in Java: *Ainsliaea, Blumeopsis,* and *Prenanthes.* Other species known from

Table 2. List of the Asteraceae genera which are known in Java but have not been recorded in Sumatera

No.	Genera	No.	Genera
1.	*Ambrosia*	22.	*Inula*
2.	*Ammobium*	23.	*Jaegeria*
3.	*Anacyclus*	24.	*Matricaria*
4.	*Anthemis*	25.	*Melampodium*
5.	*Artoctis*	26.	*Montanoa*
6.	*Athroisma*	27.	*Podachaenium*
7.	*Baltimora*	28.	*Pseudoelephantopus*
8.	*Bupthalmum*	29.	*Pterocaulon*
9.	*Calendula*	30.	*Ratibida*
10.	*Callistepus*	31.	*Rolandra*
11.	*Calyptocarpus*	32.	*Rudbeckia*
12.	*Carthamus*	33.	*Sanvitalia*
13.	*Catananche*	34.	*Scorzonera*
14.	*Centratherum*	35.	*Soliva*
15.	*Chichorium*	36.	*Stevia*
16.	*Crossostephium*	37.	*Stifftia*
17.	*Cynara*	38.	*Stokesia*
18.	*Ethulia*	39.	*Silybum*
19.	*Guizotia*	40.	*Ursinia*
20.	*Helenium*	41.	*Verbesina*
21.	*Helipterum*		

Asia and Java but not yet recorded from Sumatera and Borneo are *Gnaphalium indicum L.*, *Inula cappa* and *Senecio araneosus.* The latter species turned out to be identical with *Cisampelopsis volubilis. Inula cappa* is apparently currently called as *Synotis cappa* (Yeffrey & Chen 1984) or *Duhaldea cappa* [PI. Syst. Evol. 176 (1991) 104]. However, Koyama (1988) did not mention Java, Bali, Lombok. He reported that the distribution of /. *cappa* did not reach as far as North Thailand.

Montane genera known from Sumatera and Java but which have not been recorded from Borneo are : *Anaphalis, Gnaphalium,* and *Prenanthes* (van Steenis 1933).

Weedy Asteraceae of Sumatera

A large number of Asteraceae have been introduced and became naturalized in Sumatera. Most of them were introduced from Tropical America and the others came from elsewhere. Many of the species become an adventive weeds (Table 3). The diversity of climate, soil types, altitude and other factors have favoured the establisment and spread of Asteraceae weeds from many regions of the world. Most of the Asteraceae in Sumatera were introduced during the colonial times, among these were, for instance, the most noxious and dominant *Chromolaena odorata* and *Mikania micrantha.* Both species came from tropical America and now have spread to almost all agricultural lands and plantations.

Table 3. Exotic and important weeds species of *Asteraceae* in Sumatera with their native country (region) or distribution.

No	Species	Native country/origin or distribution	No	Species	Native country/origin or distribution
1.	*Ageratum conyzoides*	Tropical America	23.	*E. inulifolium*	America
2.	*A. houstonianum*	Tropical America	24.	*Galinsoga parviflora*	Tropical America
3.	*Artemisia vulgaris*	Europe	25.	*Gaillardia pulchella*	North America
4.	*Acmella paniculata*	Asia	26.	*Grangea maderaspatana*	Tropical Africa, Asia
5.	*A. uliginosa*	Europe, S.E. Asia	27.	*Mikania micrantha*	Tropical America
6.	*Bidens biternata*	America	28.	*M. cordata*	Asia
7.	*B. pilosa*	America	29.	*Porophyllum ruderale*	Tropical America
8.	*Centipeda minima*	America	30.	*Sonchus arvensis*	Europe, Asia
9.	*Clibadium surinamense*	America	31.	*S. asper*	Europe, Asia
10.	*Crassocephalum crepidioides*	Tropical Africa	32.	*S. oleraceuş*	Europe
11.	*Chromolaena odorata*	Tropical America	33.	*Sphaeranthus africanus*	Africa
12.	*Conyza sumatrensis*	America	34.	*S. indicus*	Tropical Asia
13.	*Dichrocephala integrifolia*	Tropical Africa	35.	*Sphagneticola trilobata*	America
14.	*Eclipta prostrata*	Tropical America	36.	*Synedrella nodiflora*	Tropical Africa
15.	*Elephantopus mollis*	America	37.	*Tithonia diversifolia*	South America
16.	*E. scaber*	Tropical Asia	38.	*Tridax procumbens*	Mexico
17.	*Eleutheranthera ruderalis*	America	39.	*Taraxacum javanicum*	Java, India
18.	*Emilia sonchifolia*	Tropical Africa, Asia	40.	*Vernonia cinerea*	Africa, S.E. Asia
19.	*Enydra fluctuans*	Cosmopolite	41.	*V. patula*	Asia
20.	*Erechtites hieraciifolia*	North America	42.	*Xanthium indicum*	America
21.	*E. valerianifolia*	America	43.	*Youngia japonica*	Asia, Australia
22.	*Eupatorium capillifolium*	America			

Among the Sumateran Asteraceae, the records in 1996 showed that there are 32 species considered as weeds (Tjitrosoedirdjo 1996). While in this report based on the observation in 2000, there are 43 species of weedy Asteraceae or thirty two percent of the total number of Asteraceae in Sumatera (Table 3). Four of these species have not been reported before for Sumatera: *Eupatorium capilifolium, Son-chus oleraceus, Shagneticola trilobata.* and *Taraxacum javanicum* .

Eupatorium capilifolium found in Payakumbuh, West Sumatera has a potential to become noxious weeds.

Sonchus oleraceous is a native of Europe, North Africa and Continental Asia. It is now a common weed in Java beween 200-2700 m altitude, especially at 800 m altitude. In Sumatera it is not yet so common. So far it is only known from two collections made in Takengon (Aceh) and in Bukit Gundaling, Berastagi (North Sumatera) at 1200-1400 m altitude.

Sphagneticola trilobata, a native of Central and South America, is usually called *Wedelia trilobata.* It seems that the plant was introduced and naturalized in Sumatera long time ago where it was used for ground ccrver and as an ornamental plant. It has escaped from these applications and now is a weed at low to high altitudes from Aceh to Lampung. Although it is now common, its occurrence was not reported before or neglected by the botanist collectors.

Taraxacum javanicum was first found in 1996 in North Sumatera at Bukit Gundaling, Berastagi, along a road side at 1400 m altitude (Tjitrosoedirdjo 310, BIOT). In West Java, it is found in montane areas between 1200-2500 m altitude, where it was first collected in 1888. In view of the tendency in *Taraxacum* to form local microspecies rapidly this may be an undescribed one, so that a specialist will have to look into this. For this time the name *T. javanicum* is employed here. According to van Soest *in* Grierson (1980), this *Taraxacum* species does not belong to the groups of indigenous to Europe as was originally assumed. *Taraxacum javanicum* has now been found in several parts of India and Sri Lanka. In Java, however, it occurs in tea plantations and it may be introduced through this industry, the same way as it has been introduced in Sri Lanka (Grierson 1980)

Among the three new weedy Asteraceae found in Indonesia reported by Dekker (1981): *Acanthospermum hispidum, Calyptocarpus vialis* and *Elephantopus mollis*, only *E. mollis* was found firstly in North Sumatera in 1980 in S. Bejingkar, Kisaran, North Sumatera (Megia 230, BIOT). It is also known from Sukarami in West Sumatera where it was found in 1987 (Tjitrosoedirdjo 50, BIOT). This species should not be confused with *Elepantopus scaber*. It has alternate leaves and white flowers, whereas *E. scaber* L. has rosulate leaves and purple flowers.

Ageratum houstonianum Mill, can easily be mistaken for the closely related *A. conyzoides* especially because the two are often found in the same habitat. It is also native to tropical America. In Sumatera, it was first fo'und in 1928 by Lorzing (13843, BO) collected in Berastagi, North Sumatera at 1200 m alt. It has now spread to Sukarami, Solok, West Sumatera at an altitude of 900 m. (Tjitrosoedirdjo 45, BIOT) and Lampung at Batu Keramat, between Gisting and Kota Agung at 500 m altitude (Tjitrosoedirdjo 415, BIOT). *A. conyzoides* is commonly found everywhere in Sumatera.

In Central and South America, the genus *Chromolaena* has about 165 species, but *C. odorata* is the only species which is now pantropically distributed. In Sumatera, the first collection was made in Deli, Lubuk Pakam in 1932 (van der Meer-Mohr 4004, BO) in tobacco plantations. After the war for independence, it had become quite common and being very distinctive by its white violet flowers, and known as "semak merdeka" (the independence shrubs) or "putihan" (whitish flowers). It has now become an important weed throughout Sumatera.

Clibadium surinamense is another native of South America, and was first reported for Sumatera by Jochems who collected the first specimen in 1932 in tobacco plantations near Medan.

Conyza sumatrensis, which is previously known as *Erigeron sumatrensis,* is a common weed in open places of fields and plantations, and distributed widely throughout Sumatera.

In Indonesia *Crassocephalum crepidioides* has been confused with *Erechtites valerianifolia* (Tjitrosoedirdjo 1987). Jochem (1931) noticed it for the first time in 1926 near Medan. It had probably come from Africa through Sri Lanka and from there to Sumatera (van Steenis 1938). Within a few years, it then rapidly spread over the whole island. In Java it was introduced from Sumatera by tea planters, and it spread widely. It has become even more common than *Erechtites hieracifolia* and *E. valerianifolia* which were introduced much earlier. *Crassocephalum crepidioides* was identified by Backer & van Slooten (1924) in their "Geillustreerd Handboek der Javaansche Thee-onkruiden (no. 233)" as *E. 'valerianifolia',* so that many pamphlets, books, publications refer to this species as *E. valerianifolia* instead *of C. crepidioides.* In the Orient *C. crepidioides* is sometimes confused with *E. hieracifolia,* as most of the labeled specimens are actually *C. crepidioides* (Belcher 1955).

The genus *Mikania* has about 400 species mainly in the warmer parts of the New World. The only indigenous species in Asia is *M. cordata* ,while *M. micrantha* is the only New World species to have been introduced there. The latter species readily takes to disturb areas and tends to be weedy (Parker 1972). It was imported from Paraguay in 1949 and planted in the Bogor Botanical Garden. In 1956 this species was introduced as a non-legume ground cover in rubber plantations. Wirjahardja (1976) reported that around 1976, it occupied the greater part of rubber plantations and abandoned agricultural areas in West and East Java and South Sumatera. Recently, in West Java and Sumatera, *M. cordata* could not be found easily since it is suppressed by *M. micrantha.*

Porophyllum ruderale, a native of Mexico and South America, was first reported in Bogor in 1945, a new record for Malesia (Tjitrosoedirdjo 1991). In 1978 the first herbarium specimens from Sumatera were collected from the transmigration areas of Lampung (Dekker & Wirjahardja 2626, BIOT) and South Sumatera (Dekker & Wirjahardja 2591, BIOT). Currently, it is commonly found in Sumatera, East and Central Java. Its occurrence has also been reported for Malaysia and Singapore (Tan & Ibrahim 1992; Turner 1995).

Some of the weedy species of Asteraceae which is currently not known in Sumatera i.e. *Praxelis clematidea (Eupatorium catarium*) and *Parthenium hyster-oporus* have a potential to become noxious weeds. *Praxelis clematidea* a native of South America, has been introduced in South China and Queensland, Australia (Veldkamp 1999). *Partenium hysterophorus* a native of the Carribean Islands has spread to Australia, South Africa, China, the Pasific Islands (Sastroutomo & Mahyudin 1990). The importation of grass seeds, cover crop seeds, wheat, grains and cattle from Australia might result to the introduction of these weeds in Sumatera. We have to be aware that those species have a potential in spreading rapidly.

CONCLUSIONS

There are 133 species of 74 genera in 11 tribes of Asteraceae in Sumatera, based on the records in 2000.

The most diverse genus is *Blumea* with 14 species. Other genera are only represented by 10 species or less, usually 4, or 3, or 2, and mostly by 1 species only.

There are 1 genus, 7 species and 2 varieties endemic to Sumatera

In terms of indigenous and endemic species Sumatera is richer than Java. The high mountain region in Sumatera is shown to be richest in the general Asteraceae flora as well as endemic species..

Thirty nine or about 53% are exotic genera and the native genera are less than half of the total number. There are 43 important weed species, which were introduced in Sumatera from Tropical America, Africa, Asia and Europe.

The exotic genera and species are introduced and naturalized in Sumatera. The diversity in climate, soil types, altitude and other factors have favoured the establishment and spread of Asteraceae weeds from many regions of the world.

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REFERENCES

Backer, C.A. 1918. Indische Duinplanten. Trop. Nat. 7: 59

Backer, C.A. & D.F. van Slooten.1924. Geillustreerd Handboek der Javaansche Thee-onkruiden. Algemeen Proefstation voor Thee. Batavia, Drukkerijen Roygrok & Co.

Belcher, R.O. 1955. The Typification of *Crassocephalum* Moench and *Gynura* Cass. Kew Bull. 3: 455-465

Bentham, G. 1873. Notes on Classification, History and Geographical Distribution of Compositae. J. Linn. Soc. Bot. 13: 335-577

Bentham, G. & J.D. Hooker. 1873. Genera Plantarum. 2: 1-224. Lovell Reeve & Co., London. Boerlage, J.G. 1891.

Flora van Nederlandsch Indie (Compositae). E.J. Brill, Leiden.

Cassini, H. 1816. Troissieme Memoire sur le Synantherees, Analyse de la corolle. J. Phys. Chim. Hist. Nat. Arts. 82: 116-146

Cassini, H. 1817. Quatrieme Memoire sur la Familie des Synantherees, Contenant 1'analyse de 1'ovaire et de ses Assessoires. J. Phys. Chim. Hist. Nat. Arts 85: 5-21

Cassini, H. 1818. Composees. In G. Cuvier, Diet. Sci. Nat. 10: 131-159

Cassini, H. 1826-1934.Opuscules Phytologiques. 3 Volumes. Paris

Dalla Tore, C.G. de & H. Harms. 1907. Genera Siphonogamarum. Lipsieae, Berlin.

Dekker, R. J. 1981. Notes on New or Remarkable Indonesian Weed species. Proc. Konp. HIGI Medan.

Jack, W. 1820. The Malayan Miscellanies. Bencoolen

Jeffrey, C. & Y. L. Chen 1984. Taxonomic Studies on the Tribe Senecioneae (Compositae) of Eastern Asia. Kew Bull. 39, 2:319

Jeffrey, C. 1986. The Senecioneae in East Tropical Africa. Kew Bull. 43: 195-277 Jefrey, C. 1988. The Vernonieae

of East Tropical Africa. Kew Bull. 43:195-277.

Jeffrey, C. 1995. Compositae Systematic 1975-1993. Developments and Desiderata. *In* Advances in Compositae Systematics D.J. N. Hind, C. Jeffrey & G.V. Pope (ed.). The Royal Botanic Garden Kew. Vol I.

Jochems, S.C.J. 1931. De invoer van twee nieuwe Composieten in Deli *(Gynura* sp. en *Clibadium surinamense).* Trop. Nat. 20: 5-10

Jones, S.B. 1979. Synopsis and pollen morphology of *Vernonia* (Compositae Vernonieae) in the New World. Rhodora 425-447.

Jones, S.B. 1981. Synoptic Classification and Pollen Morphology of *Vernonia* (Compositae: Vernonieae) in the Old World. Rhodora 83: 59-75

Grierson, A.J.C. 1980 *in* Dassanayake, M.D. Revised Handbook of the Flora of Ceylon 1 (111). Amerind, New Delhi.

Hasselt, A.L. van 1884. Bijdragen tot de kennis der flora van midden Sumatra. Flora in Veth. Midden Sumatra 4(2): 1:49

Hoffmann, O. 1890-1894.Liguliflorae-Cichorieae in Engler & Prantl. Die Naturlichen Pflanzenfamilien Kilian, N.

1997. Revision *ofLaunaea* Cass. (Compositae, Lactuceae, Sonchinae). Englera 17: 288-296 Koster, J.Th. 1935. The

Compositae of the Malay Archipelago. Blumea 1(3): 352-538 Koster, J.Th. 1941. Notes on Malay Compositae 1.

Blumea 4(3): 482-492

Koster, J. Th. 1948. Notes on Malay Compositae II. Blumea 6(1): 264-365

Koster, J. Th. 1952. Notes on Malay Compositae III. Blumea 7(1): 288-291

Koster, J. Th. 1953. Some Annotation to the Compositae Collected by O/Beccari in Borneo & Sumatra.

Koster, J. Th. 1958. Notes on Malay Compositae IV. Blumea Supplement IV: 170-177

Koster, J. Th. 1965.Compositeae. In Backer and Bakhuizen van den Brink f. Fl. of Java Vol. II: 362-437

Koster, J. Th. 1966. The Compositae of New Guinea I. Nova Guinea Bot. 24: 479-614

Koster, J. Th. 1970. The Compositae of New Guinea II. Blumea 18(10: 137-145

Koster, J. Th. 1975. The Compositae of New Guinea III. Blumea 22(2): 207-217

Koster, J. Th. 1976. The Compositae of New Guinea IV. Blumea 23: 163-175

Koster, J. Th. 1979. The Compositae of New Guinea V. Blumea 25(1): 249-282

Koster, J. Th. 1980. The Compositae of New Guinea VI. Blumea 26(l):233-243

Koyama, H. 1988. Taxonomic Studies in the Compositae of Thailand. Acta Phytotax. Geobot. 39: 161

Melchior, H.A. 1964. Engler's Syllabus der Pflanzen Familien II. Band. Berlin Gebruder Borntragen

Miquel, F.A.W. 1856. Flora van Nederlandsch Indie 2: 1-116. Tweede deel. Fried. Fleischer, Leipzig. Amsterdam, Utrecht.

Miquel, F.A.W. 1861. Flora van Nederlandsch Indie, Eerste bijvoegsel, Sumatra:210-213, 535-537. C.g. van der Post, Amsterdam.

Nasution, U. 1984. Gulma dan Pengendaliannya di Perkebunan Karet Sumatera Utara dan Aceh (Weeds and Their Control in Rubber Plantations in North Sumatera and Aceh) PP4M-Tanjung Morawa (in Indonesian)

Parker, C. 1972. *TheMikania* Problems. PANS 18(3): 312-315

Rao, R.R. & B. Datt. 1996. Diversity, Phytogeography of Indian Compositae. *In* Proceedings Compositae Conference. Vol. I: 445-461.

Ridley, H.N. 1923. The Flora of the Malay Peninsula. L. Reeve & Co., Ltd. London. Vol. II.: 177-197 Ross, M.C. 1993.

Annual Report Foundation Flora Malesiana 1992. Fl. MalesianaBulI.il(2): 131-142 Royen, P. van. 1983. The Alpine Flora

of New Guinea 4: 3139-3451. J. Cramer, Vaduz.

Satroutomo, S.S. & A.A. Mahyudin. 1990. *Partenium hysterophorus L.* Pest Data Sheet No.: 43. ASEAN Pest Plant Quarantine Center and Training Institute Malaysia.

Shaw, H.K. Airy. 1981. The Euphorbiaceae of Sumatera. Kew Bull. 36(2): 239-373

Steenis, C.G.G.J. van 1933. On the Origin of the Malaysian Mountain Flora. Part 1. Fact and Statement of the Problems. Bull. Jard. Bot. Buit. 13(3): 125-417

Steenis, C.G.G.J. van 1938. *Gymtra crepidioides* Bth. A recently Introduced weed in S.E. Asia. Current Science VII: 285

Soerjani, M, A.J.G. Kostermans & G. Tjitrosoepomo. 1987. Weeds of Rice in Indonesia. Balai Pustaka, Jalarta

Tan, H.T.W., Ibrahim, Ali bin & Chua, K.S. 1992. Addition to the Flora of Singapore I Gard. Bull of Singapore 44: 129

Tjitrosoedirdjo, Sri S. 1987. Field Characterization of the Confused Species *Crassocephalum crepidioides* and *Erechtites valerianifolia* in Indonesia. Proceed. APWSS. Conf. Taipei.

Tjitrosoedirdjo, Sri S. 1991. The Present Status and Potential of *Porophyllum ruderale* var *ruderale* in Indonesia. Proc. APWSS Conf. Jakarta.

Tjitrosoedirdjo, Sri S. 1996. Gulma Anggota Suku Asteraceae di Sumatera (The Weedy Asteraceae Species of Sumatera). Proc. HIGI, Bandar Lampung

Tjitrosoedirdjo, Sri S. 2001. Progress on the Studies of Asteraceae in Sumatera. Taxonomy: The Cornerstone of Biodiversity. Proceedings of the Fourth International Flora Malesiana Symposium 1998. Forest Research institute Malaysia, p: 181-186

Tjitrosoedirdjo, Sri S. 2002. Four new taxa of Asteraceae in Sumatera. Reinvvardtia 12 (1): 125-128 Turner, I.M. 1995. A

catalogue of the Vascular Plants of Malaya. Card. Bull, of Singapore 47(1): 168-172

Veldkamp, J.F. 1999. *Eupatorium catarium* a New Name for *Eupatorium clematidea* Griseb. Non. Sch. Brp. (Compositae), a South American Species Naturalized and Spreading in S.E. Asia and Queensland, Australia. Card. Bull. Singapore 51(1): 119-124

Whitmore, T.C. & I.G.M. Tantra. 1986. Tree Flora of Indonesia. Checklist for Sumatra. Forest Research and Development Research Center, Bogor, Indonesia

Wirjahardja, S. 1976. Autecological Study *ofMikania* spp. BIOTROP Internal Report. 7p.

Appendix 1

List of the genera and species of Asteraceae in Sumatra. Accepted genera and species in bold, synonyms in italic.

Achillea L.
Achillea millefolium L.
Acmella Rich, ex Pers.
Acmella paniculata (Wall, ex DC.) R.K. Jansen
Spilanthespaniculata Wall, ex DC.
Spilanthes acmella auct. non Murr.
Acmella uliginosa (Sw.) R. Cass.
Jaegera uliginosa (Sw.) Baker
Spilanthes iabadicensis A.H. Moore
Spilanthes uliginosa Sw.
Adenostemma Forster & G. Forster
Adenostemma lavenia (L.) Kuntze
Adenostemma fastigiatum (Blume) DC.
Lavenia vastigiata Blume *Verbesina lavenia* L.
Adenostemma macrophyllum (Blume) DC.
Adenostemma parviflorum (Blume) DC.
Adenostemma ovatum Miq.
Lavenia parviflora Blume
Ageratum L.
Ageratum houstonianum Mill.
Ageratum conyzoides L.
Ainsliaea DC.
Ainsliaea latifolia (D. Don) Sch. Bip.
Ainsliaeapteropoda DC.
Liatris latifolia D. Don
Anaphalis DC.
Anaphalis javanica (Reinw. ex Blume) Sch. Bip.
Antennaria javanica (Reinw. ex Blume) DC
Antennaria saxatilis DC.
Gnaphalium javanicum Reinw. ex Blume
Gnaphalium saxatile Blume
Anaphalis longifolia (Blume) DC.
Gnaphalium longifolium Blume
Artemisia L.
Artemisia scoparia Waldst. & Kit.
Artemisia vulgaris L. Aster L.
Aster novae-angliae L.
Symphyotrichum novae-angliae (L.) Nesom
Virgulus novae-angliae (L.) Reveal & Keener
Aster novi-belgii L.
Symphyotrichum novi-belgii (L.) Nesom
Asteromoea Blume
Asteromoea indica (L.) Blume
Aster indicus L.
Boltonia indica (L.) Benth.
Austroeupatorium R M. King & H. Rob.
Austroeupatorium inulifolium (Kunlh) R.M. King & H. Rob. *Eupatorium inulifolium* Kunth
Eupatorium javanicum auct. non Blume
Eupatorium pallescens DC.
Bidens L.
Bidens biternata (Lour.) Merr. & Sherrf ex Sherff
Bidens chinensis (L.) Willd.
Coreopsis biternata Lour.
Bidens pilosa C Blumea DC.
Blumea balsamifera (L.) DC.
Blumea grandis (Wall.) DC.
Conyza balsamifera L.
Blumea bicolor Merr.
Blumea clarkei Hook. F.
Blumea lessingii Merr.
Blumea densitlora DC.
Blumea hieraciifolia (D. Don) DC.
Blumea chinensis Walpers
Blumea subsericans
Elmer *Erigeron hieraciifolius* D. Don
Blumea intermedia J. Koster
Blumea junghuhniana (Miq.) Boerl.
Blumea dacycoma (Miq.) Boerl.
Conyza dacycoma Miq.
Conyza junghuhniana Miq.
Blumea korthalsiana (Miq.) Boerl.
Conyza korthalsiana Miq.
Blumea lacera (Burm. f.) DC.
Blumea lactucifolia DC.
Blumea runcinata DC.
Conyza lacera Burm. f.
Blumea laciniata (Roxb.) DC.
Blumea crepidifolia DC.
Blumea javanica (Blume) Zoll.
Blumea runcinata DC.
Blumea sonchifolia DC.
Conyza javanics Blume
Conyza laciniata Roxb.
Blumea lanceolaria (Roxb.) Druce
Blumea laxiflora Elmer
Blumea longifolia DC.
Blumea myriocephala DC.
Blumea spectabilis DC.
Conyza lanceolaria Roxb.
Blumea riparia (Blume) DC.

Blumea semivestita DC.
Conyza riparia Blume
Blumea sylvatica (Blume) DC.
Blumea sessilifolia (Blume) DC.
Conyza sessilifolia Blume
Conyza sylvatica Blume
Blumea tenella DC
Blumea humifusa (Miq.) Boerl.
Conyza humifusa Miq.
Blumeopsis Gagnep.
Blumeopsis flava (DC.) Gagnep.
Blumea flava DC.
Blumeopsiafalcata auct. non Merr.
Laggera flava (DC.) Benth.
Boltonia L'Her
Boltonia asteroides (L.) L' Her
Matricaria asteroides L.
Carpesium L.
Carpesium cernuum L.
Centaurea L.
Centipeda Lour.
Centipeda minima (L.) A. Br. & Aschers.
Artemesia minima L.
Centipeda minuta (G.Forst.) Benth. ex CB. Clark
Centipeda orbicularis Lour.
Cotula minima (L.) Willd.
Cotula minuta G. Forst.
Grangea minima (L.) Poir
Chromolaena DC.
Chromolaena odorata (L.) R.M. King & H. Rob.
Eupatohum odoratum L.
Chrysanthemum L.
Chrysanthemum coronarium L.
Bupthalmum oleraceum Lour.
Chrysanthemum roxburghii (Desf.) DC.
Glebionis coronaria (L.) Tzvel.
Pyrethrum roxburghii Desf.
Chrysanthemum morifolium Ramat.
Matricaria morifolia Ramat.
Pyrethrum sinense (Sabine) DC.
Cissampelopsis (DC.) Miq.
Cissampelopsis volubilis (Blume) Miq.
Cacalia volubilis Blume
Senecio araneosus DC.
Senecio blumei DC.
Senecio walkeri auct. non Arn.
Clibadium Allamand ex L.
Clibadium surinamense L.
Conyza Less.
Conyza japonica (Thunb.) Less, ex DC.
Escenbachiajaponica (Thunb.) J. Koster
Conyza leucantha (D. Don) Ludlow & Raven
Blumeopsis falcate (D. Don) Merr.
Conyza vicidula Wall, ex DC.
Escgenbachia vicidula (DC.) J. Koster
Erigeron falcatum D. Don
Erigeron leucanthum D. Don
Conyza sumatrensis (Retz.) Walker
Erigeron sumatrensis Retz.
Erigeron linifolius auct. non Willd.
Coreopsis L.
Coreopsis grandiflora Hogg ex Sweet
Coreopsis tinctoria Cav.
Cosmos Cav.
Cosmos bipinnatus Cav.
Cosmos **caudatus** Kunth
Cosmos sulfureus Cav.
Bidens. sulfurea (Cav.) Sell. Bip.
Cotula L.
Cotula anthemoides L.
Crassocephalum Moench.
Crassocephalum crepidioides (Benth.) S. Moore
Crassocephalum diversifolium Hiern
Gynura crepidioides Benth.
Dahlia Cav.
Dahlia pinnata auct. non Cav.
Dicrocephala L. Her. ex DC.
Dicrocephala integrifolia (L.f.) Kuntze
Cotula bicolor Roth
Dicrocephala bicolor (Roth) Schlechtend.
Dicrocephala latifolia (Pers,) DC.
Grangea latifolia (Pers) Poir.
Eclipta L.
Eclipta prostrata (L.) L.
Eclipta alba Hassk.
Eclipta erecta L.
Verbesina prostrate L.
Elephantopus L.
Elephantopus mollis Kunth
Elephantopus martii Graham ex Sch. Bip.
Elephantopus lomentosus auct. non L.
Elephantopus sea her L.
Eleutheranthera Poit.
Eleutheranthera ruderalis (Sw.) Sch. Bip.
Eleutheranthera. prostrata (Sw.) Sch. Bip.
Kegelia ruderalis Sch. Bip.
Melampodium ruderale Sw.
Ogiera ruderalis (Sw.) Griseb.
Emilia Cass.
Emilia coccinea (Sims) G. Don
Cacalia cocinea Sims
Cacalia sagitata Willd.
Emilia javanica auct. non C.B. Rob.
Emilia sagittata DC.
Emilia prenanthoidea DC.
Emilia sonchifolia (L.) DC.
Cacalia sonchifolia L.

Crassocephalum sonchifolium (L.) Less.
Emilia purpurea Cass.
Emilia rigidula DC.
Enydra Lour.
Enydra fluctuans Lour.
Meyerafluctuans (Lour.) Spreng.
Erechtites Raf.
Erechtites hieraciifolia (L.) Raf. ex DC.
Senecio hieraciifolius L.
Erechtites valerianifolia (Wolf) DC.
Crassocephalum valerianifolium Less.
Erechtites petio/ata auct. non Benth.
Gymtra rosea Ridl.
Eupatoriutn L.
Eupatorium capillifolium (Lam.) Small
Artemesia capillifolia Lam.
Chrysosoma capillacea Michx.
Eupatorium foenicoloides Walt.
Gaillardia Foug.
Gaillardia pulchella Foug.
Galinsoga Ruiz & Pavon
Galinsoga parvillora Cav.
Gerbera Cass.
Gerbera jamesonii Bolus ex Adlam
Glossocardia Cass.
Glossocardia leschaenaultii (Cass.) Veldk.
Chrysanthellum indicum auct. non DC.
Chrysanthellum leschenaultii (R. Cass.) Backer ex Kostcr
Chrysanthellum procumbens auct. non L.C.M. Rich.
Gnaphalium L.
Gnaphalium japonicum Thunb.
Gnaphalium pensylvanicum Willd.
Gamochaetapensylvanicum (Willd.) Cabrera
Gnaphalium perigrinum Fern.
Granges Adans.
Grangea niaderaspatana (L.) Poir.
Artemesia maderaspatana L.
Gynura Cass.
Gynura aurantiaca (Blume) DC.
Gynura densiflora Miq.
Gynura lyrata Sch. Bip. ex Miq.
Gynura mollis Sch. Bip ex Zoll.
Gynura sumatrana Miq.
Gynura procumbens (Lour.) Merr.
Cacalia procumbens Lour.
Cacalia sarmentosa Blume
Gynura sarmentosa (Blume) DC.
Helianthus L.
Helianthus angustifolius L.
Helianthus annuus L.
Helianthus tuberosus L.
Hclichrysum Mill.
Helichrysum orientale (L.) Gaertn.
Gnaphalium orientale L.
Lactuca L. Lactuca indica L.
Pterocypsela indica (L.) C. Shih
Lactuca laevigata (Blume) DC.
Aracium laevigatum (Blume) Miq.
Ixeridium laevigatum (Blume) Pak & Kawano
Prenanthes laevigata Blume
Lactuca saliva L. Launaea Cass.
Launaea sarmentosa (Willd.) Sch. Bip. ex Kuntze
Ammoseris sarmentosus (Willd.) DC.
Lactuca sarmentosa (Willd.) DC.
Launaea pinnatifida Cass.
Prenanthes sarmentosa Willd.
Laggera Sch. Bip. ex Koch
Laggera alata (D. Don) Sch. Bip. ex Oliver
Blumea alata (D. Don) DC.
Conyza alata (D. Don) Roxb.
Erigeron alatum D. Don
Lagenophora Cass.
Lagenophora lanata A. Cunn.
Lagenophora gracilis Steetz
Lagenophora stipitata auct. Druce
Lagenophora sundana Miq.
Leucanthemum Mill.
Leucanthemum vulgare Lam.
Chrysanthemum leucanthemum L.
Microglossa DC.
Microglossa pyrifolia (Lam.) Kuntze
Conyzaprolifera Blume
Conyza pyrifolia Lam.
Mycroglossa volubilis DC.
Mikania Willd.
Mikania cordata (Burm.f.) B.L. Rob.
Eupatorium cordatum Burm. f.
Eupatorium volubile Vahl.
Mikania scandens auct. non Willd.
Mikania volubilis (Vahl.) Willd.
Mikania micrantha Kunth
Myriactis Less.
Myriactis javanica (Reinw. ex Blume) DC.
Bellisjavanica Reinw. ex Blume
Notonia DC.
Notonia grandiflora Wall, ex DC.
Senecio grandiflorus (DC.) Jacobsen
Senecio indicus Backer ex Heyne
Pluchea Cass.
Pluchea indica (L.) Less.
Baccaris indica L.
Porophyllum Guett.
Porophyllum ruderale (Jacq.) Cass.
Cacalia ruderalis (Jacq.) Sw.

Kleinia ruderalis Jacq.
Porophyllum ellipticnm Cass.
Prenanthes L.
Prenanthes scandens Hook. F. ex Benth.
Prenanthes steenisii Tj.
Prenanthes stenolimba Steenis
Prenanthes sumatrana Tj.
Rhyncospermum Blume
Rhyncospermum verticillatum Reinw. ex Blume
Senecio L.
Senecio dewildeorum Tj.
Senecio sumatranus Martelli
Senecio korintjianus Boerl.
Sigesbeckia L
Sigesbeckia orientalis L.
Solidago L.
Solidago canadensis L.
Sonchus L.
Sonchus arvensis L.
Sonchus asper (L.) Hill.
Sonchus malaianus Miq.
Sonchus oleraceus L
Sphaeranthus L.
Sphaeranthus africanus L.
Sphaeranthus indicus L.
Sphagneticola O. Hoffm.
Sphagneticola calendulacea (L.) Pruski
Complaya chinensis (Osbeck) Strother
Telechitonia chinensis (Osbeck) H. Rob. & Cuatrecasas
Verbesina calendulacea L,
Wedelia calendulacea (L.) Less.
Wedelia chinensis (Osbeck) Merr.
Sphagneticola trilobata (L.) Pruski
Complaya trilobata Strother
Seruneum trilobatum (L.) Kuntze
Silphium trilobatum L.
Thelechitonia trilobata (L.) H. Rob. & Cuatrecasas
Wedelia trilobata (L.) A. Hitchc.
Struchiuni P. Br.
Struchium sparganophorum (L.) Kuntze
Ethulia sparganophora L.
Ethulia struchium Sw.
Sparganophorus vailantii Crantz
Sparganophorus struchium Poir.
Synedrella Gaertn.
Synedrella nodiilora (L.) Gaertn.
Verbesina nodiflora L.
Tagetes L.
Tagetes erecta L.
Tagetes major Gaertn.
Taraxacum Wigger
Taraxacum javanicum Soest.
Taraxacum offlcinale Wigger
Tridax L
Tridax procumbens L.
Tithonia Desf. ex Juss.
Tithonia diversifolia (Hemsl.) A. Gray
Mirasolia diversifolia Hemsl.
Urbanisol tagetiflora (Desf.) Kuntze
Tithonia rotundifolia (Mill.) S.F. Blake
Tagetes rotundifoliaM\\\. Desf.
Tithonia tagetiflora Desf.
Vernonia Schreb.
Vernonia arborea Buch.-Ham.
Gynanthemum arboreum (Buch.-Ham) H. Rob.
Strobocalyx arborea (Buch.-Ham) Sch. Bip.
Vernonia cinerea (L.) Less.
Conyza cinerea L.
Cyabthillium cinereum (L.) H. Rob.
Senecioedes cinerea (L.) Post & Kuntze
Vernonia coronata J. Koster
Vernonia cymosa Blume
Vernonia durifolia J. Koster
Vernonia forbesii S. Moore
Vernonia patcntissima J Koster
Vernonia patula (Dryand.) Merr.
Conyza patula Dryand.
Cyanthillium villosum Blume
Vernonia chinense (Less.) Less.
Vernonia subdentata J. Koster
Vernonia vagans **DC.**
Gymnanthemum vegans DC.
Wedelia Jacq.
Wedelia biflora (L.) DC.
Seruneum biftorum (L.) Kuntze
Seruneum strigulosum (K. Schum.) Kuntze
Wolastonia biflora (L.) DC.
Wolastonia slrigulosa (K. Schum.) Kuntze
Wedelia montana (Blume) Boerl.
Seruneum montanum (Blume) Kuntze
Wolastonia Montana Blume
Verbesina Montana Blume
Wedelia urticifolia (Blume) DC.
Seruneum urticifolium (L.) Kuntze
Verbesina urticifolia Blume
Wolastonia urticifolia (Blume) Hassk.
Xanthium L.
Xanthium indicum Koenig. ex Roxb.
Xanthium inequilaterum DC.
Youngia Cass.
Youngia japonica (L.) DC.
Zinnia L.
Zinnia elegans Jacq.